

**REMARKS**

Claims 1-21 were pending. No claims have been cancelled or amended and new claims 27-28 have been added by this response. Claims 22-26 were previously cancelled. Support for new claim 27-28 may be found throughout the specification, but particularly in paragraphs [0040]-[0041] and [0126]. Thus, no new matter has been added, and claims 1-21 and 27-28 are currently pending.

Reconsideration of the application in view of the current claims is respectfully requested in view of the amendments and the following Remarks.

**Objection to the Specification**

The specification was objected to for failing to provide antecedent basis for the phrase “intra-pulse frequency” of claims 8 and 18. Applicants respectfully disagree. The Applicants’ specification, and in particular, Figure 8 and paragraph [0050], explicitly describes “intra-pulse frequency” and provides examples of how to select the intra-pulse frequency for applying the current depending on the location of the coil, as recited by claims 8 and 18. For example, “intra-pulse frequency” is the third temporal attribute shown under the “temporal attributes” section of FIG. 8, describing variables in the production of magnetic stimulation. Furthermore, paragraph [0050] of the specification describes how an exemplary controller running software can adjust the intra-pulse frequency (e.g., “the software application appropriately regulates the power of the pulses, interval between pulses and the *frequency content of the pulses* driving the stimulating the electromagnets as a function of the locations of those electromagnets relative to the target region”).

Thus, the Applicants submit that the specification provides antecedent basis for the phrase “intra-pulse frequency” in at least the portions of the specification identified above, and requests withdrawal of this objection to the specification.

**Claim Rejections**

**A. 35 U.S.C. §112, first paragraph**

Claims 4, 8, 14, and 18 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. In particular, claims 4 and 14 recite “adjusting the current” and claims 8 and 18 recite “intra-pulse frequency”.

The applicants respectfully disagree.

a. Claims 4 and 14

Claim 4 depends from claims 1 and 3, and claim 14 depends from claims 12 and 13. Both claims recite that the current is adjusted by the inverse of the square of the distance between the coil and the target when adjusting the current to the coil at each location so that the magnetic field at the target is constant.

The specification, and in particular paragraphs [0087]-[0092] and figure 9 explicitly teach one of skill in the art how to adjust the current using the inverse of the square of the distance. In fact, at least four alternative methods of adjusting the current based on the inverse square of the distance between the coil and the target are taught. Paragraph [0089] teaches the first one (“In one embodiment, this is accomplished by having the software that controls the present invention maintain a computation of the distance between each coil and the target. The inverse of the square of the distance figure is then calculated, and this number controls is used to calculate a direction, and number of “steps” for a stepper motor turn. The shaft of the step motor is, in turn, rigidly coupled to the shaft of a high-capacity rotational potentiometer interposed between TMS generator 300 and coils 6 and 10. Consequently, as one of the coils moves further from the target, the high-capacity potentiometer is automatically turned by the step motor, and the resistance is appropriately lessened so as to increase the current traveling to the coil...”). Paragraph [0091] teaches another (“In an alternative embodiment, current may be shunted away from the coils to a

variable degree that reflects distance between coil and target...”). And paragraph [0092] teaches yet another (“In still another alternative embodiment, the TMS generator unit may have several banks of different sized capacitors...”).

Claims 4 and 14 are therefore fully described and enabled sufficiently for one of skill in the art to make and/or use the invention. The Applicant’s therefore respectively request withdrawal of the rejection of claims 4 and 14 under 35 U.S.C. §112, first paragraph.

b. Claims 8 and 18

Claims 8 and 18 were discussed briefly above, in response to the Objection to the Specification. As mentioned, the phrase “intra-pulse frequency” is described in the specification, including a description of how it is adjusted. One of skill in the art, reading the specification, and particularly figure 8 and paragraph [0050] would clearly understand that the intra-pulse frequency is the frequency content of the pulses that may be adjusted and set by the controller, as described. The Applicants respectfully point out that the phrase “intra-pulse frequency” is well known in the art, and is easily understood from the phrase. “Intra” is a common English prefix meaning “within.” The intra-pulse frequency is the frequency component within a pulse, which is (as described in figure 8) a temporal attribute of the magnetic stimulation.

Claims 8 and 18 are therefore fully described and enabled sufficiently for one of skill in the art to make and/or use the invention. The Applicant’s therefore respectively request withdrawal of the rejection of claims 8 and 18 under 35 U.S.C. §112, first paragraph.

**B. 35 U.S.C. §112, second paragraph**

Claims 4, 8, 14, and 18 stand rejected under 35 U.S.C. §112, second paragraph as failing to comply with the written description requirement. In particular, claims 4 and 14 recite “adjusting the current” and claims 8 and 18 recite “intra-pulse frequency”.

The applicants respectfully disagree.

As described above, the specification explicitly describes, and provides multiple examples, of what is meant by “the current is adjusted by the inverse of the square of the distance between the coil and the target,” as recited in claims 4 and 14. This phrase is therefore sufficiently well described in the specification for one of skill in the art to understand what is meant by the claim, and to understand the metes and bounds of the claim. Thus a rejection under 35 U.S.C. §112, second paragraph is not appropriate (MPEP §2173.02).

Similarly, the specification explicitly describes what is meant by the term “intra-pulse frequency”, as described above. The term is sufficiently clear and precise that one of skill in the art would understand what is meant by the term, particularly in light of the specification. Thus a rejection under 35 U.S.C. §112, second paragraph is not appropriate (MPEP §2173.02).

The Applicants therefore request withdrawal of the 35 U.S.C. §112, second paragraph rejections of claims 4, 8, 14, and 18.

**C. 35 U.S.C. §102(b) rejection over US Publication No. 2003/0050527 to Fox et al.**

Claims 1, 2, 5-7, 9-12, 15-17, and 19-21 stand rejected over US Publication No. 2003/0050527 to Fox et al. (“Fox”). The Applicants respectfully disagree.

Fox does not show or teach all of the elements and steps recited in independent claims 1 and 12, from which claims 2, 5-7, 9-11, 15-17 and 19-21 depend. In particular, Fox does not teach “applying current to the coil at a plurality of locations in order to direct magnetic fields *to the target* such that the magnetic field energy over time is higher at the target than areas around the target.” All of the Applicants pending claims require the application of magnetic field energy from multiple locations to the same target. In contrast, Fox teaches only directing magnetic field energy from multiple locations to different targets. For example, refer to paragraph [0086] of Fox, referenced by the Office Action as anticipating claim 1:

“... By use of such a robot, maintenance of a pre-specified treatment position may be more precise and accurate than a passive arm or a hand-held device. Furthermore, a robot allows

movement through a treatment zone (rather than treatment of a point) and further allows precisely timed treatments of multiple sites in a single session" (Fox, paragraph [0086], emphasis added).

Fox describes using a robotic control system only to treat multiple targets (points), rather than a single target. There is no teaching, or even suggestion, in Fox to direct magnetic field energy from multiple points to a single target so that the magnetic field energy over time at that target adds up and is higher than the surrounding region.

This distinction between the method taught by Fox and the Applicant's claimed method is a fundamental one. The applicants have developed, described and claimed in claims 1 and 12 a method of treating a specific target by applying energy from multiple different trajectories. Fox is directed to a method of optimizing efficacy of transcranial magnetic stimulation by orienting the induced electrical field (E), which they refer to as their "Cortical Column Cosine Aiming Principle" or "CCCAP", "CAPS", or "aiming principle" (see, e.g., paragraphs [0018]-[0021] and Figure 1). This principle says that the stimulation of a specific target should be performed from a particular position relative to the cortex, not from multiple positions, as recited in claims 1 and 12. In particular, Fox teaches that stimulation should be "an E-field oriented parallel to the columnar organization of the cortex".

Further, the methods (i.e., the CCCAP method) taught by Fox teach away from moving the magnetic coil in order to stimulate a target from multiple regions. As Fox teaches, there is an optimal position, from which the stimulation should be applied for a particular target: "...As the optimal position for the TMS to achieve supra-threshold stimulation of the target location has been previously computed, the translations and rotations needed to move from the present position to the desired position are computed.... When properly positioned and oriented, TMS delivery is effected."

Since Fox does not teach or describe all of the features of claims 1, 2, 5-7, 9-12, 15-17, and 19-21, it cannot anticipate these claims. In order to anticipate a claim, a reference must teach every limitation of the claim. Thus, the Applicant respectfully requests withdrawal of the 35

U.S.C. §102(b) rejection of claims 1, 2, 5-7, 9-12, 15-17, and 19-21, and allowance of the pending claims.

**D. 35 U.S.C. §103(a) rejection over Fox and US 6,461,289 to Muntermann**

Claims 3 and 13 stand rejected under 35 U.S.C. §103(a) over Fox in view of US 6,461,289 to Muntermann (“Muntermann”). Applicant’s respectfully disagree.

As described above, Fox does not teach every element recited by claims 1 and 12, from which claims 3 and 13 depend. In particular, Fox does not teach “applying current to the coil at a plurality of locations in order to direct magnetic fields *to the target*.” Furthermore, Muntermann cannot cure this deficiency. Muntermann describes the application of a magnetic field having both a constant and an alternating (frequency) component, but does not teach or even suggest applying magnetic energy from a coil at multiple locations directed to a single target.

Since neither Fox nor Muntermann teach or suggest all of the elements of claims 3 and 13, these claims cannot be obvious over these references. The Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 3 and 13, and allowance of all of the pending claims for at least the reasons described above.

## CONCLUSION

In light of the remarks set forth above, The Applicants respectfully solicit the Examiner to expedite the prosecution of this patent application to issuance. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at (650) 287-2164.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 50-4050 referencing docket no. 10220-712.200. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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By:

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